CLAIMS

1. A light transmitting filter comprising:

a) a light absorbing layer of material having a front surface and a back surface,

(b) transparent microspheres embedded in the light absorbing layer and contacting the front surface of the light absorbing layer with portions of the microspheres protruding through the back surface of the light absorbing layer for transmitting light through the light absorbing layer, and

(c) a conformed layer of optically clear material having a front surface and a back surface wherein the front surface of the conformed layer is in contact with and conforming in shape with the protruding portions of the microspheres, and wherein the back surface of the conformed layer has a textured finish.

2. The filter of claim 1 wherein the light absorbing layer comprises a polymeric material and at least one pigment or colorant.

3. The filter of claim 1 wherein the light absorbing layer comprises a polyacrylate, a polyurethane, or a polyvinyl acetal, and at least one pigment or colorant.

4. The filter of claim 1 wherein the microspheres are glass microspheres having a diameter of from about 25 to about 300 microns.

5. The filter of claim 1 wherein the conformed layer has an average thickness of from about 2.5 microns to about 270 microns.

6. The filter of claim 1 wherein the conformed layer is substantially uniform in thickness and has an average thickness in the range of from about 2.5 microns to about 270 microns.

7. The filter of claim 1 wherein the front surface of the light absorbing layer is adhered to an optically clear support layer.

8. The filter of claim 7 wherein the clear support layer comprises a polyester or a polyacrylate.

9. The filter of claim 1 further comprising a polymeric tie layer between the clear conformed layer and the back surface of the light absorbing layer.

10. The filter of claim 1 wherein the textured finish is a matte finish.

11. A light transmitting filter comprising:

(A) a light absorbing layer of material having a front surface and a back surface,

(B) a monolayer of transparent microspheres embedded in the light absorbing layer and contacting the front surface of the light absorbing layer, with portions of the microspheres protruding through the back surface of the light absorbing layer thereby providing light tunnels for transmitting light through the light absorbing layer, and

(C) a conformed layer of optically clear polymeric material having a front surface and a back surface wherein the front surface of the conformed layer is in contact with and conforming in shape with the protruding portions of the microspheres, and wherein the back surface of the conformed layer has a textured finish.

12. The filter of claim 11 wherein the light absorbing layer has a thickness of about 10% to about 60% of the average diameter of the microsphere.

13. The light filter of claim 11 wherein the microspheres are glass microspheres which have a refractive index of from about 1.4 to about 2.3.

14. The filter of claim 11 in which the monolayer of transparent microspheres are generally covering from about 60% to about 90% of the surface area of the light absorbing layer.

15. The filter of claim 11 in which the transparent microspheres have an average diameter of from about 25 to about 300 microns and the microspheres vary in diameter through the range of less than 50% of the average diameter of the microspheres.

16. The filter of claim 11 wherein the conformable layer comprises a polyacrylate or a polyvinyl acetal.

17. The filter of claim 11 wherein the light absorbing layer comprises a polyacrylate, a polyurethane, or a polyvinyl acetal, and at least one pigment or colorant.

18. The filter of claim 11 wherein the front surface of the light absorbing layer of the filter is adhered to an optically clear support layer.

19. The filter of claim 18 wherein the optically clear support layer comprises a polyester or a polymethacrylate.

20. The filter of claim 11 wherein the light absorbing layer comprises a thermoplastic polyurethane and at least one pigment or colorant.

21. The filter of claim 11 wherein the textured finish is a matte finish.

22. A method of preparing a light transmitting filter comprising the steps of:

(1) providing a first assembly comprising a light absorbing layer having a front surface and a back surface wherein the front surface is adhered to a substrate, and a monolayer of transparent microspheres embedded in the light absorbing layer;

(2) providing a second assembly comprising an optically clear conformable layer comprising a front surface and a back surface, said back surface having a textured finish, a molding layer having a front surface and a back surface wherein the front surface of the molding layer has a textured finish

and is in contact with the back surface of the conformable layer, and the back surface of the molding layer is in adherent contact with a substrate;

(3) laminating the back surface of the microsphere containing layer of the first assembly to the front surface of the optically clear conformable layer of the second assembly;

(4) removing the molding layer and substrate whereby the conformed layer remains on the microspheres, and the back surface of conformed layer has a textured finish.

23. The method of claim 22 wherein the substrate of the first assembly is removed from the filter.

24. The method of claim 22 wherein the substrate of the first assembly comprises an optically clear substrate.

25. The method of claim 22 wherein the substrate of the first assembly is multilayered.

26. The method of claim 22 in which the Vicat softening point of the molding layer is less than the Vicat softening point of the optically clear conformable layer.

27. The method of claim 22 in which the light absorbing layer has a thickness of from about 10% to about 80% of the microsphere diameter.

28. The method of claim 22 in which the transparent microspheres which provide light tunnels through the light absorbing layer cover from about 60% to about 90% of the back surface of the light absorbing layer.

29. The method of claim 22 in which the transparent microspheres have a refractive index of from about 1.4 to about 2.3.

30. The method of claim 22 in which the transparent microspheres have an average diameter of from about 25 to about 300 microns and vary in diameter through a range of less than 50% of the average diameter of the microspheres.

31. The method of claim 22 wherein the conformable layer comprises a polyacrylate or a polyvinyl acetal.

32. A method of preparing a light transmitting filter comprising the steps of:

(1) providing a first assembly comprising a light absorbing layer having a front surface and a back surface wherein the front surface is adhered to a substrate;

(2) providing a second assembly comprising an optically clear conformable layer comprising a front surface and a back surface, said back surface having a textured finish, a molding layer having a front surface and a back surface wherein the front surface of the molding layer has a textured finish and is in contact with the back surface of the conformable layer, a monolayer of transparent microspheres embedded in the front surface of the optically clear polymeric layer, and the back surface of the molding layer is in adherent contact with a substrate;

(3) laminating the back surface of the light absorbing layer of the first assembly to the microsphere containing front surface of the optically clear conformable layer of the second assembly, wherein the microspheres provide light tunnels through the light absorbing layer and protrude from the back surface of the light absorbing layer;

(4) removing the molding layer and substrate whereby the conformed layer remains on the microspheres, and the back surface of conformed layer has a textured finish.

33. The method of claim 32 wherein the substrate of the first assembly is removed from the filter.

34. The method of claim 32 wherein the substrate of the first assembly comprises an optically clear substrate.

35. The method of claim 32 wherein the substrate of the first assembly is multilayered.

36. The method of claim 32 in which the Vicat softening point of the molding layer is less than the Vicat softening point of the optically clear conformable layer.

37. The method of claim 32 in which the light absorbing layer has a thickness of from about 10% to about 80% of the microsphere diameter.

38. The method of claim 32 in which the transparent microspheres which provide light tunnels through the light absorbing layer cover from about 60% to about 90% of the back surface of the light absorbing layer.

39. The method of claim 32 in which the transparent microspheres have a refractive index of from about 1.4 to about 2.3.

40. The method of claim 32 in which the transparent microspheres have an average diameter of from about 25 to about 300 microns and vary in diameter through a range of less than 50% of the average diameter of the microspheres.

41. The method of claim 32 wherein the conformable layer comprises a polyacrylate or a polyvinyl acetal.

42. A method of preparing a light transmitting filter comprising the steps of:

(1) providing a first construction comprising a molding layer having a front surface and a back surface, a first support layer on the back surface of the molding layer, and an optically clear polymeric layer on the front surface of the molding layer wherein the optically clear polymeric layer has a front surface and a back surface, and the back surface is textured, and wherein the Vicat softening point of the optically clear polymeric layer is greater than the Vicat softening point of the molding layer,

(2) providing a second construction comprising a light absorbing layer having a first surface and a second surface, and a second support layer on the front surface of the light absorbing layer,

(3) heat laminating the front surface of the optically clear polymeric layer of the first construction to the back surface of the light absorbing layer of the second construction,

(4) removing the first support layer and the molding layer from the laminate, whereby the back surface of the conformed layer has a textured finish, provided that either the first construction or the second construction contains transparent microspheres, and the transparent microspheres form light tunnels through the light absorbing layer.

43. The method of claim 42 wherein the second construction also comprises an optically clear layer between the light absorbing layer and the second support layer.

44. The method of claim 42 wherein the support layer of the second construction comprises an optically clear layer.

45. The method of claim 42 wherein the support layer of the second construction is removed from the filter.

46. The method of claim 42 wherein the support layer of the second construction is multilayered.

47. The method of claim 42 wherein the molding layer comprises a polyolefin, and the first support layer is a paper or a polymeric liner.

48. The method of claim 42 wherein the light absorbing layer comprises a polyacrylate, a polyvinyl acetal or a thermoplastic polyurethane and at least one pigment or colorant.

49. The method of claim 42 wherein the transparent microspheres are embedded in the light absorbing layer of the second construction.

50. The method of claim 42 wherein the transparent microspheres are embedded in the optically clear polymeric layer of the first construction.

51. The method of claim 42 wherein the transparent microspheres are glass.

52. The method of claim 42 wherein the transparent microspheres have an average diameter of from about 25 to about 300 microns.

53. The method of claim 42 wherein the microspheres have a refractive index of from about 1.4 to about 2.3.

54. The method of claim 42 wherein the light absorbing layer has a thickness of from about 10% to about 80% of the diameter of the microspheres.